Deployable Distributed Mission Operations...
Coming to a Theater Near You

**I/ITSEC 2004
Joint Virtual Training
Special Event**

Setting: Deployed location far from home bases

Combat zone: Nevada Test and Training Range

Mission: Execute Time-Sensitive-Targeting (TST) and Joint Close Air Support (JCAS) scenarios with Joint Terminal Attack Control (JTAC) coordinated by Airborne Warning and Control System (AWACS) operators

Total Force: Vermont Air National Guard (ANG) F-16 pilots from the 134 Fighter Squadron (FS); active duty and Air Force Reserve Command (AFRC) A-10 pilots from the 706 FS, New Orleans LA; Oregon ANG Air Battle Managers (ABM) from the 116 Air Control Squadron; an active duty JTAC operator from the Information Directorate of Air Force Research Laboratory (AFRL/IF); and space operators representing the Air Vehicles Directorate (AFRL/VA).

Maj "Booma" Wang, 302nd FS, reviews mission details before flying in a scenario as Viper 1 in one of the F-16 simulators at MRS. The digital brief/debrief system at I/ITSEC 2004 supported distributed mission planning, briefing, and debriefing for warfighters deployed to Orlando FL

Although the Distributed Mission Operations (DMO) setting for the deployed warfighters was in a friendly environment, the 2004 Interservice/Industry Training, Simulation and Education Conference (I/ITSEC) in Orlando FL showcased how deployable systems can support readiness training and mission rehearsal for geographically separated warfighter teams. Central to the "*Coming to a Theater Near You*" theme, a Mobile Expandable Container Configuration™ (MECC) housed a four-ship of F-16 experimental Deployable Tactical Trainers (DTT) and a digital system enabling real-time distributed mission planning, briefing, execution, and debriefing for the 134 FS Viper pilots.

Team Mesa designed the DTTs and brief/debrief system to fit completely within the MECC, allowing easy deployment and setup in any arena, including austere combat zones. Although the I/ITSEC 2004 demonstration simulated an austere deployment for the Viper pilots in the MECC, the realities of DMO technologies and methods proved the value of networked nodes covering the gamut of Command and Control (C2) and Intelligence, Surveillance, and Reconnaissance (ISR) warfighting systems. The demonstration also highlighted the latest research architecture designed to help assess warfighter performance in real-time and archive data for in-depth scientific analysis.

Within the I/ITSEC 2004 floor space, the DTTs were networked to a variety of virtual systems: an A-10 Full Mission Trainer (FMT), two AWACS consoles, a prototype JTAC trainer, and a space vehicle simulator developed in partnership with AFRL/VA. These systems were connected to Mesa Research Site (MRS) AZ, where Viper pilots flew two F-16 Multi-Task Trainers (MTT) as part of the air-to-air and air-to-surface mission packages.

Additionally, Joint Forces Command added multiple computer-generated forces (CGF) ground systems and air threats via a network switch as part of the Joint Virtual Training Special Event (JVTSE) conducted at the convention site. The Next Generation Threat System (NGTS) used unclassified data

Maj "Sully" Sullivan, 706th FS, flies Hawg 1, while attacking targets on the Nevada Test and Training Range database from the A-10 FMT on the I/ITSEC 2004 convention floor in Orlando FL

to represent 31 of the 3,000 CGF entities in the JVTSE, including T-80 and M-1 tanks, SCUD and surface-to-air missiles, HUMVEEs, and MiG-29 aircraft. NGTS was developed by Team Mesa and has been transitioned for acquisition in systems such as those envisioned in the US Navy's Aviation Simulation Master Plan, and I/ITSEC 2004 marked the first public demonstration in an international forum.

Adding a touch of C2 and ISR capabilities to the air and surface action orchestrated by the ABM and JTAC warfighters, a synthetic Space Maneuver Vehicle (SMV) demonstrated Battle Damage Assessment (BDA) by collecting post-strike "imagery" from the target area. Running as part of the AFRL/VA Space Access Vehicle Mission Operations Simulator, the Space Operations Simulator demonstrated how an SMV could be tasked to over fly areas of interest and obtain high-fidelity images for thorough BDA analysis in a Combined Air and Space Operations Center (CAOC).

Reliable computer networks are vital to DMO events, and the I/ITSEC 2004 demonstration featured unique low-cost solutions enabled by the expansive capabilities proffered across the Internet. Team Mesa obtained two Internet bandwidth "pipes" between MRS and Orlando, each capable of supporting 1.4 megabits per second (MBS), with one reserved for the Distributed Interactive

Simulation (DIS) traffic and one for the video tele-conference (VTC) network supporting the brief/debrief system.

The virtual and constructive DMO systems communicated through the DIS protocol, with DIS information between MRS and Orlando nodes protected by TACLANE KG-175 Type 1 encryptors certified by the National Security Agency. By accessing the public Internet from Orlando, engineers connected through the Defense Research and Engineering Network to access the systems at MRS with an average 272 kilobits per second going through the link with resultant latency (delay) of less than 138 milliseconds. During JVTSE missions with nearly 5-fold increase in entity state update traffic, the network averaged 890 kilobits per second. Although the demonstration involved public domain information, the TACLANEs guaranteed security of the transferred data over the Internet for seamless warfighter operations between Arizona and Florida.
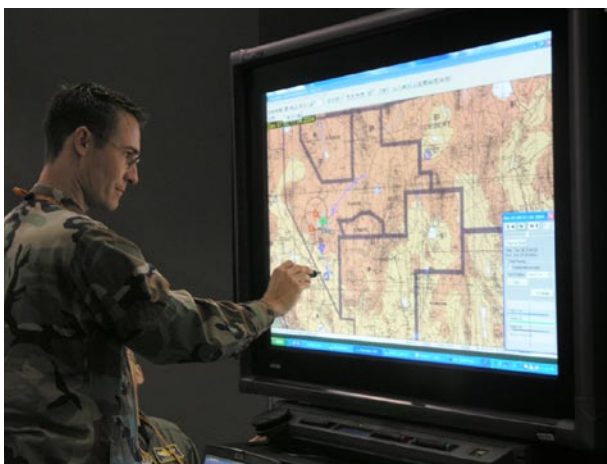
To support exclusive mission planning, briefing, and debriefing among the separate warfighters, Team Mesa employed a Virtual Private Network (VPN) for the point-to-point audio and video needs of the digital VTC system. Incorporating government-developed and commercial-off-the-shelf (COTS) technologies, this system features routers capable of handling the 1.4MBS data, Portable Flight Planning System "Falcon View" software, interactive SmartBoards©, software enabling shared applications, 42" plasma screens, and Click to Meet™ software for integrated voice, video, and data col-

134th FS pilots of the Vermont ANG flew DMO scenarios from experimental DTTs at Orlando FL while Team Mesa members monitored missions on the digital brief/debrief system inside the MECC deployed for I/ITSEC 2004

laboration. The Triple Data Encryption Standard (DES), consisting of a succession of three cryptographic algorithms as a cipher "key," protected the VPN "channel" connecting the sites. Triple DES uses 168 binary digits (data bits) to generate a unique key for VPN users to encipher and decipher binary coded information, and renders the encrypted cipher unintelligible to anyone else.

The synergy of interactive training technologies and methods showcased the potential of deployable DMO to enhance combat readiness.

The Division's deployable DMO demonstration was announced on the I/ITSEC 2004 convention floor by a sign atop the MECC. The four experimental DTTs and digital brief/debrief system are "containerized" for shipment within the MECC to simplify deployment and setup anywhere in the world

Capt Ira Schurig makes real-time updates to the brief/debrief system while DMO scenarios play out over the Nevada Test and Training Range (interactive map depicted)

Total Force warfighters at I/ITSEC 2004 made the Division's Deployable DMO demonstration a success! The five F-16 pilots from the 134th FS, Vermont ANG (rear), executed complex scenarios with active duty and AFRC A-10 pilots from the 706th FS, New Orleans (desert flight suits, front), who flew JCAS missions directed by the active duty JTAC (in Battle Dress Uniform) under the watchful eye of 116th Air Control Squadron, Oregon ANG, ABM C2 experts deployed to Orlando FL

TARGETS OF OPPORTUNITY

✈ Team Mesa ensures DMO scenario execution accurately simulates the complex **C2 decision-making processes** of prosecuting TST and JCAS missions. This expertise in CAOC operations stems from thoroughly researched Mission Essential Competencies (MEC) addressing combat readiness levels needed for key positions within CAOCs worldwide. Air Combat Command (ACC) and the Electronic Systems Center plan to use MEC products to help define CAOC training requirements and develop training syllabi. A complementary research effort aims to design and develop alternative models to optimally integrate air, space, and information operations. Conceived by senior USAF leadership, the Division will provide technical support to facilitate integration and evaluate CAOC operations through warfighter-in-the-loop experiments based on emerging CAOC structures.

✈ In a cross-directorate collaboration with Directed Energy (AFRL/DE), MRS is "home" to a four-ship of **High Energy Laser (HEL) Fighters.** Partnered with AFRL/DE and the DMO Center of Excellence, Team Mesa integrated the HEL Fighter software into the four F-16 MTTs operating in the DMO Testbed to help develop Tactics, Techniques, and Procedures (TTP) and an initial concept of operations for integrating laser weapons in fast-jet operations. During an Advanced Concepts Event (ACE) facilitated by a DMO exercise, highly experienced "Top Hats," F-16 instructor pilots from the 310 FS

(Luke AFB AZ), flew complex air-to-air scenarios and provided feedback on TTP options for the HEL Fighter. AFRL/HEA assessed performance during the ACE scenarios and will compare this research exercise with historical cohort data derived from ongoing DMO training research supported by ACC. The Top Hats acknowledged a DMO environment may be the only place warfighters will ultimately be able to train in these types of systems for tactically realistic scenarios.

✈ Division researchers completed a series of visits to several operational locations for the **cryptolinguist training research project**, including the Defense Language Institute in Monterrey CA and Goodfellow AFB TX. The Division is partnered with a sister division, AFRL/HEX Special Projects, to determine the best methods to reinforce linguistic competency, raise job performance, and improve cognitive skills to enhance mission readiness for USAF cryptolinguists. The program also seeks to improve USAF's ability to produce and sustain the necessary number of properly trained and mission-proficient cryptolinguists. The effort has already produced a federal initiatives report to lay the foundation for a baseline analysis, and guideline models for cryptolinguist education and training are forecast for mid-2005 delivery.

✈ The Division recently increased the space available for its human cognition research by leasing 12,000 square feet of lab and office space near MRS. **The Performance and Learning Models (PALM)** research team will use half the space to conduct empirical research and create computational and mathematical models of human cognition. The other half will be used by the Cognitive Engineering Research Institute (CERI), a local non-profit research organization, under a Cooperative Research and Development Agreement to expand PALM research in verbally-interactive synthetic CGFs by leveraging CERI's team training research infrastructure.

Dr. Henk Ruck, AFRL/HE Director, does the honors while Col Curt Papke and Dr.Kevin Gluck, PALM Lab Team Lead, hold the ribbon along with Division leadership, the Williams Gateway Airport Executive Director, and a representative of the construction firm, Himovitz Properties

BRIEFS AND DEBRIEFS

✈ Air Traffic Control (ATC) personnel will benefit from a just-in-time Night Vision Goggle (NVG) training package, consisting of eight sets of equipment developed and tested by Team Mesa. The package includes computer-based training modules, NVG resolution charts, and deployable battery-powered illuminators for use during NVG focusing procedures. This capability provides training for deployed ATC members supporting Operation Enduring Freedom (OEF) and Operation Iraqi Freedom (OIF). Team Mesa certified proper function of 24 sets of NVGs earmarked for ATC use.

✈ Division members recently participated in the coalition mission training demonstration Exercise First Warfighter Alliance in a Virtual Environment (EFW). EFW, a large-scale, seven-nation, real-time distributed mission training demonstration, connected 14 sites, enabling participants to plan, brief, "fly," and debrief EFW coalition mission scenarios. The US has facilitated development, manage-

PRIDE IN THE PAST
FAITH IN THE FUTURE

Team Mesa Celebrates 35 Years of Readiness Research

Col Curt Papke (Bottom), current AFRL/HEA Division Chief and MRS Commander, represents the line of succession passed along by previous site leadership spanning the days when the organization was the AF Human Resource Lab

A four-ship of F-16s from 56th Fighter Wing, Luke AFB AZ, punctuated the Air Force presence during opening ceremonies for the 35th Anniversary of the Lab at MRS

Mr. Michael Aimone, Assistant Deputy Chief of Staff, Installations and Logistics (USAF), escorted by Maj Marcus Darling, listens while Dr. Wink Bennett explains how MRS infrastructure supports readiness research programs

ment, and assessment of EFW, and Team Mesa members led efforts of the Research and Technical panels to ensure objective performance measures critical for determining warfighter training effectiveness can support future research for ongoing DMO readiness programs.

✈ Commissioned by General Gregory S. Martin, Commander, Air Force Materiel Command, the Division is co-leading an Integrated Product Team to develop alternative Technical Order styles for use by flightline maintenance technicians. As the first step towards organizing prototypes and designing human factors and usability evaluations, the Division orchestrated a demonstration of maintenance technical manuals based on audio-visual media.